

## Rice Blast: Virulence and Oxidation States of Manganese

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Beamline(s): **X26A**

*Pyricularia grisea*, the cause of rice blast, oxidizes Mn from the physiologically available  $\text{Mn}^{2+}$  form to the non-available oxidized  $\text{Mn}^{4+}$  form. Using micro-X-ray adsorption near edge structure (XANES) spectroscopy and X-ray fluorescence spectroscopy (XFS), we determined the valence state and spatial distribution of Mn and other elements in and around the infection site of a susceptible line and its near-isogenic resistant line of rice inoculated with *P. grisea*. Manganese in non-infected tissues of both rice lines was in the  $\text{Mn}^{2+}$  state, while Mn in necrotic tissues was in the oxidized  $\text{Mn}^{4+}$  form. Necrotic tissues accumulated Mn, and chlorotic tissues adjacent to the brown necrotic lesions were depleted of Mn. *Pyricularia*-produced toxins are strong chelating compounds and could be involved in maintaining availability of Mn for the pathogen, while increasing diffusion of Mn from non-infected to infected tissues. Resistance appears related to inhibition of pathogen-induced oxidation of Mn.